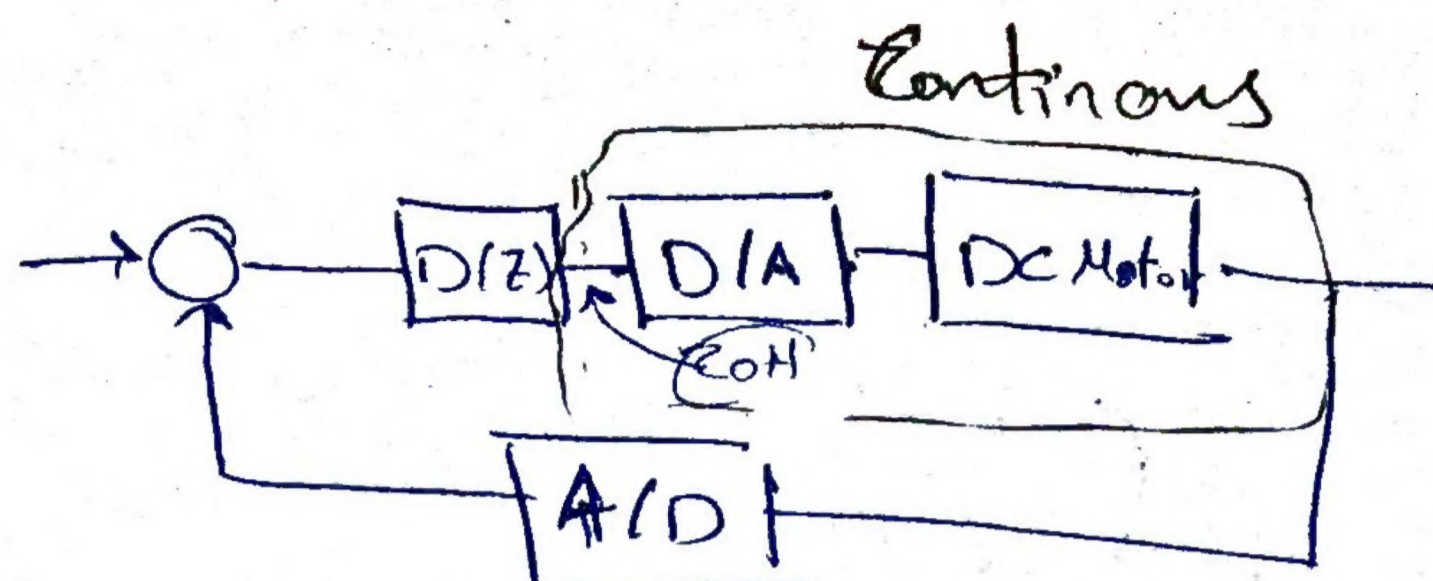


Discrete Equivalent Design Method

Phases of Control System design

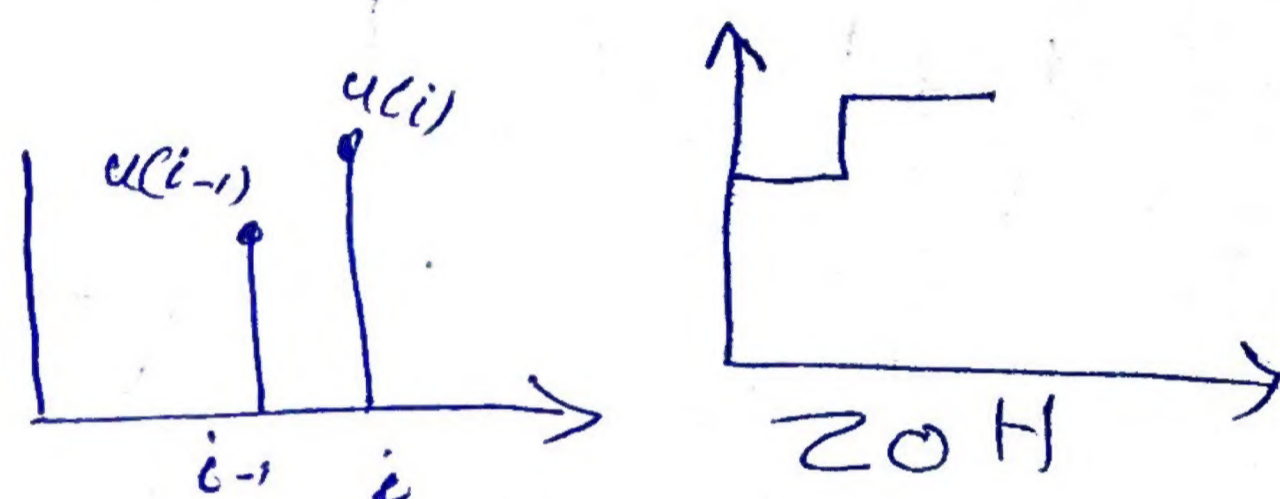
- Modeling
- Analysis
- Design
- Implementation



Control Action: Value in Register

$$G(s) = \frac{1 - e^{-Ts}}{s}$$

$$G(z) = Z \left[G(s)_{ZOH} G(s)_{Plan} \right]$$

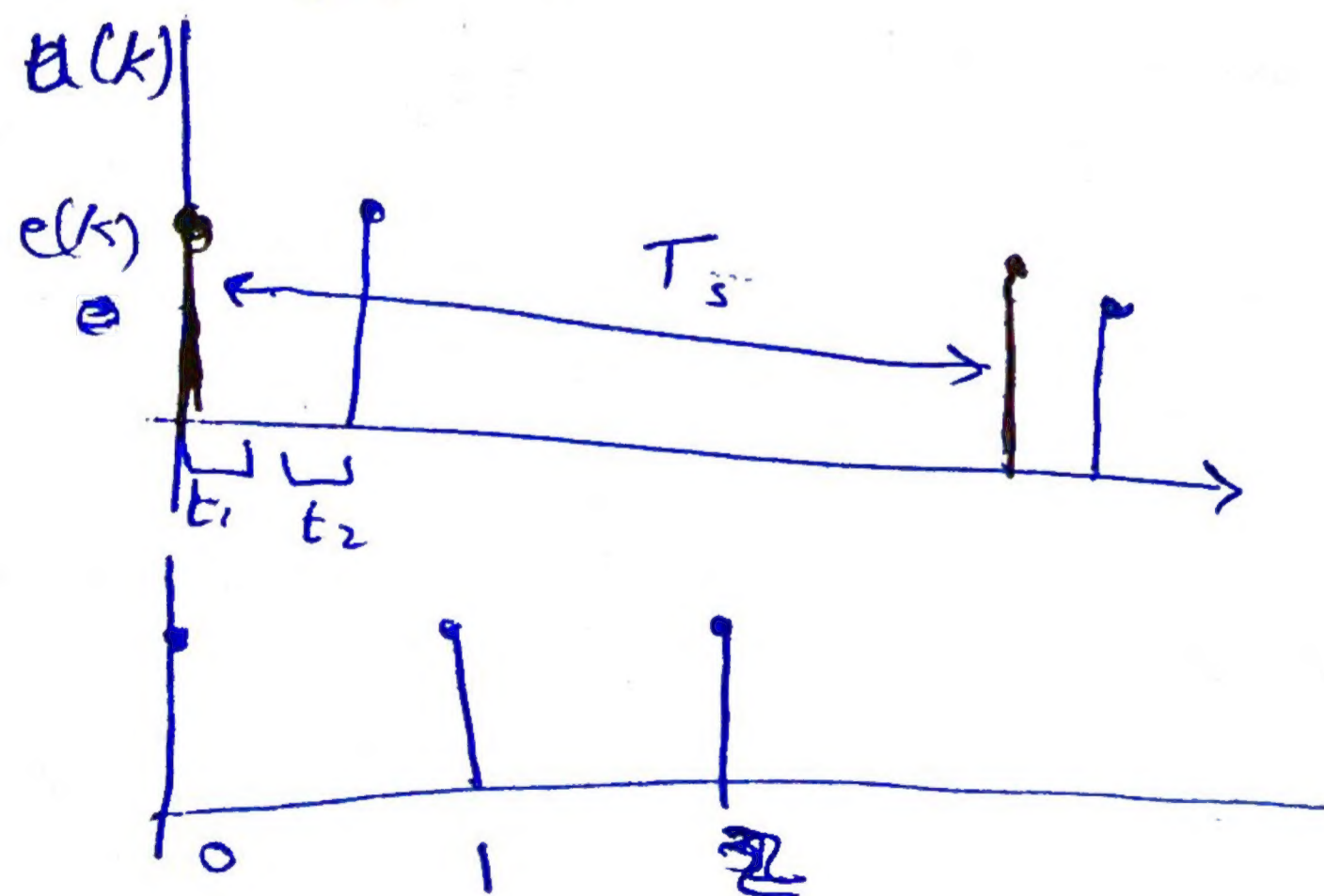
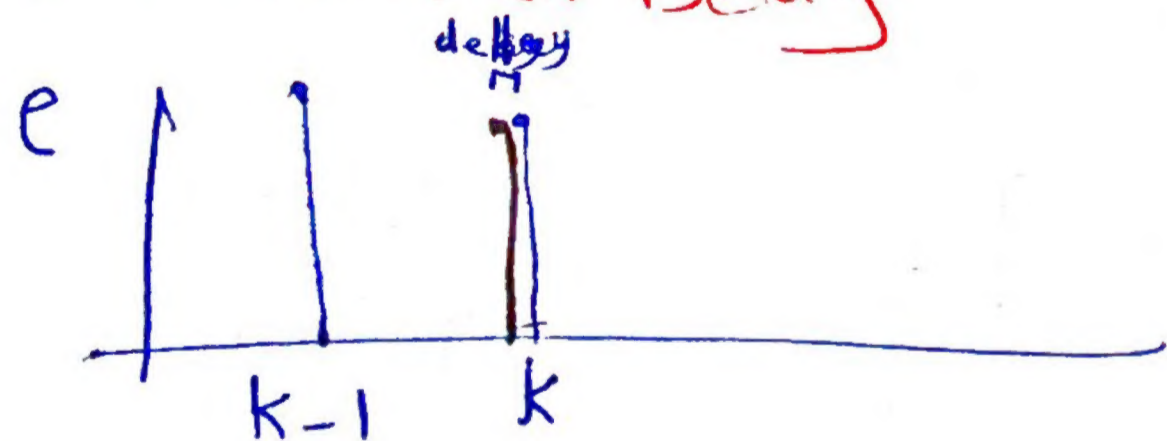


4. Implementation
for designed Compensator

$$D(z) = \frac{az + b}{z + c} = \frac{U(z)}{E(z)}$$

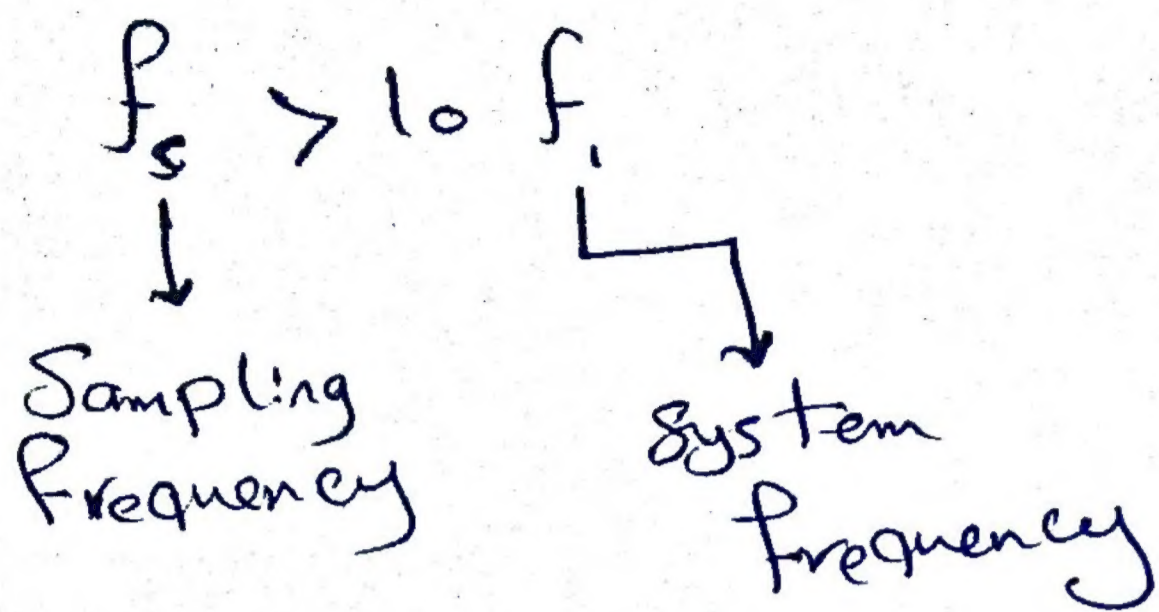
$$u(k) = a \cdot e(k) + b \cdot e(k-1) - cu(k-1)$$

~~x~~ Computation Delay



$$t_c \leq \frac{1}{10} T_s$$

②



State is Pure integrator of the system.

Bilinear

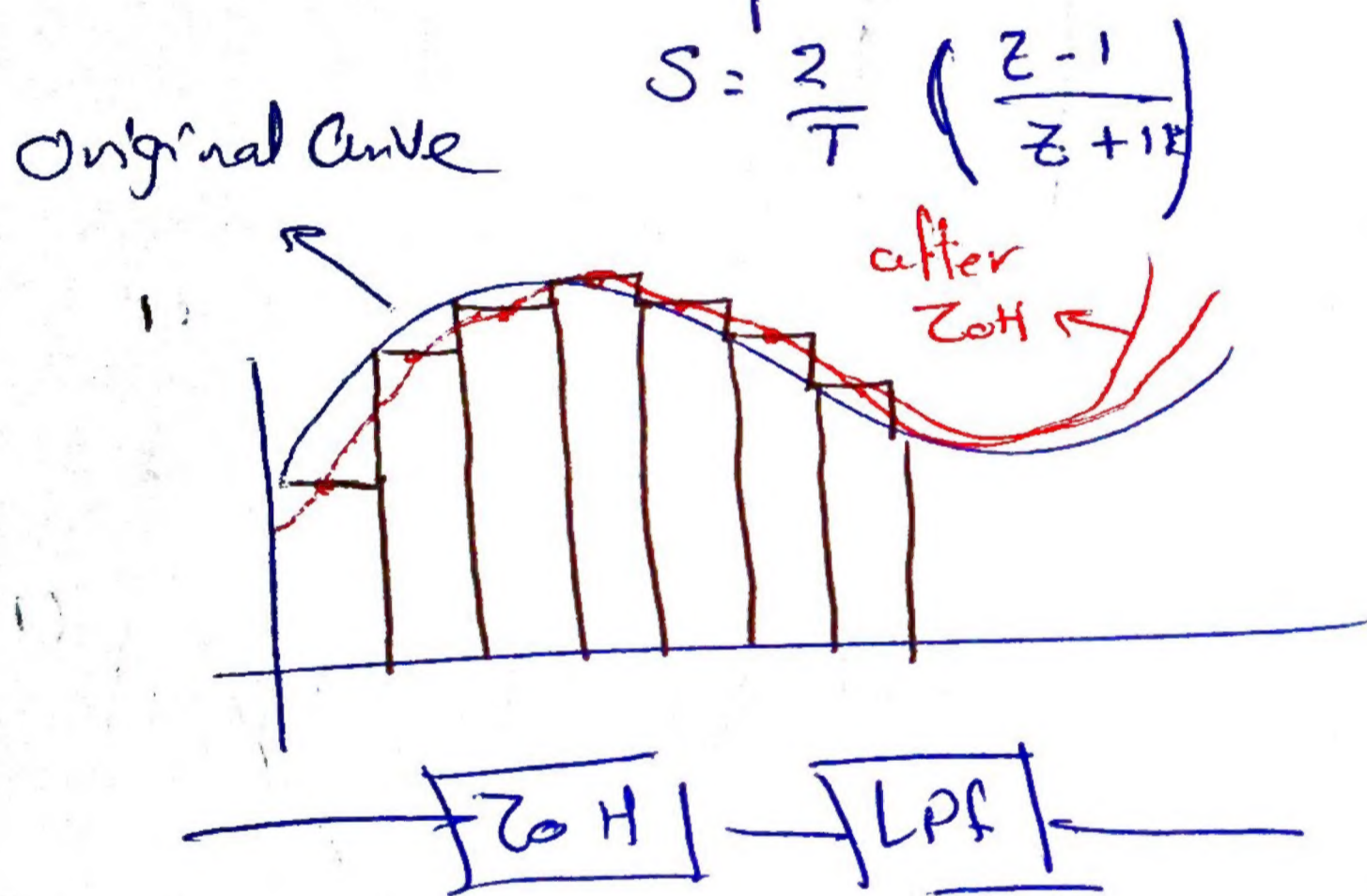
$$S = \frac{2}{T} \left(\frac{z-1}{z+1} \right)$$

Controller in Discrete

$$D(z) = D(s)$$

Difference eqn

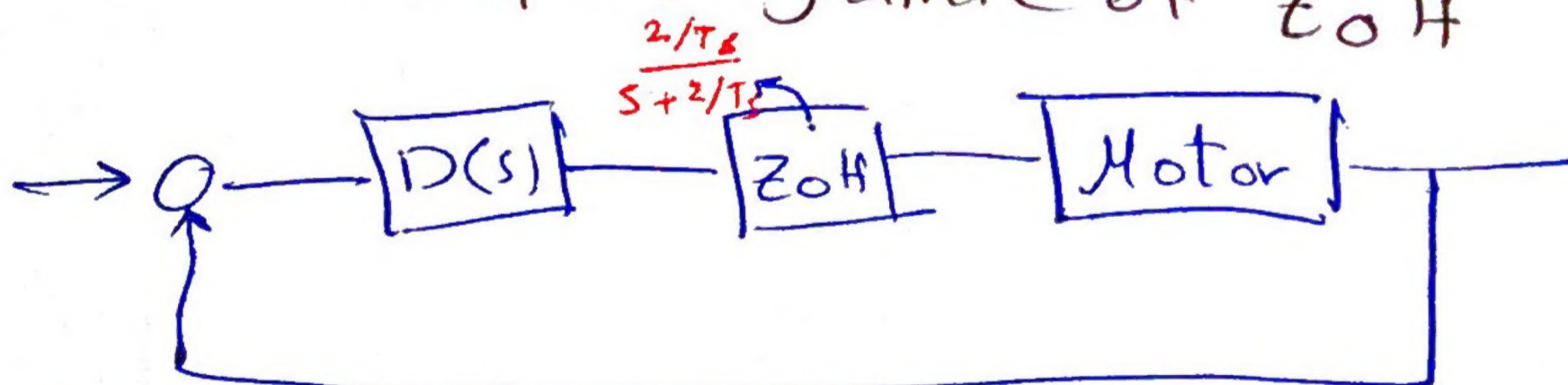
$$u(k) = a \cdot e(k) + b \cdot e(k-1) + c \cdot u(k-1)$$



LPF: low pass filter

So effect of ZOH delay by $\boxed{T/s}$

we have to compute dynamic of ZOH



Dynamic of ZOH

Approximated

$$G_{ZOH}(s) = \frac{2/T}{s + 2/T}$$

Assumption

$$- f_s > 10 f_i$$

$$- t_c \ll T_s$$

↑
Computation time